LVI.—*Preliminary Notes on new Fishes collected in Japan during the Expedition of H.M.S. 'Challenger.'* By Dr. A. Günther, F.R.S., Keeper of the Zoological Department, British Museum.

The collection of fishes made during the expedition of H.M.S. 'Challenger' having been intrusted to me for examination, I propose to give preliminary diagnoses of the fishes of some of the faunistic districts, as the execution of the plates will, of necessity, retard the publication of the complete account. Typical specimens of the species described will be deposited in the British Museum after the completion of the work.

Centrophorus squamulosus.

Snout much produced, the mouth being nearly midway between the first gill-opening and the end of the snout. The distance between the nostrils is two fifths of the length of the præoral portion of the snout. The labial fold extends a little way along the margins of the mouth. Pectoral short, with the lower angle rounded, not produced. The first dorsal small; its base (without spine) is shorter than that of the second, and nearly one sixth of the distance between the two fins. Spines very small, scarcely projecting beyond the skin. Extremity of the ventral fins below the end of the second dorsal. The scales are tricuspid, with a median keel, and so minute as to give a velvety appearance to the skin. Uniform deep black.

Off Inosima.

Centrophorus foliaceus.

Snout much produced, the mouth being nearer to the first gill-opening than to the end of the snout. The distance between the nostrils is two sevenths of the length of the præoral portion of the snout. The labial fold extends a little way along the margins of the mouth, the angle of the mouth being received in a deep longitudinal slit of the skin. The anterior teeth of the upper jaw triangular, erect; the lateral slightly oblique; they are arranged in two regular rows. No median tooth in the lower jaw. Pectoral short, with the lower angle rectangular, not produced. Dorsal spines strong, nearly as high as the fins. The first dorsal rather lower than the second, but with its base longer, the length of the base (without spine) being two fifths of the distance between the two fins. Extremity of the ventral fin a little behind the dorsal spine. The scales are pedunculated, terminating in three spines, of

which the middle is the longest, corresponding to a strong median keel of the scale. Uniform greyish.

Off Inosima.

Raja isotrachys.

Snout rather produced, the anterior margins meeting at nearly a right angle. The width of the interorbital space equals the length of the orbits. The distance between the outer margins of the nostrils equals their distance from the end of the snout. Teeth small, each with a point directed backwards towards the interior of the buccal cavity. Outer pectoral angle rounded; but the margins of the fin would meet at a right angle. Body and tail entirely covered on the upper surface with minute asperities, each with a stellate base. No spines on the superciliary margin. A single small spine in the middle of the back. A series of rather strong spines (eighteen) along the median line of the tail, none on the sides. Upper parts uniform brownish grey; lower parts smooth, brownish black.

Coast of Southern Japan.

Sebastes macrochir.

D. 14 | $\frac{1}{9}$. A. $\frac{3}{5}$ P. 17/5. L. lat. ca. 45.

The height of the body is contained thrice and one fourth in the total length without caudal; the length of the head twice and a half. Scales rather regularly arranged. Eye very large, one third the length of the head, much longer than the snout. Mouth wide; the maxillary extending to behind the middle of the eye. The bands of intermaxillary teeth are of moderate breadth; but those of the vomer, palatines, and mandible are very narrow. Interorbital space flattish, scaleless, narrow, its width being only two fifths of the diameter of the orbit. Occipital region flat, with some rudimentary scales. A series of spines runs along each side of the forehead and occiput. It consists of a spine in front of the orbit, three above it, and two on each side of the occiput. Infraorbital ridge with strong spines. Præoperculum with five pointed spines on the margin. Each ramus of the mandible with five large muciferous apertures. Dorsal spines rather feeble; the third to the sixth are the longest, two fifths of the length of the head. Anal spine stronger, but shorter than the longest of the dorsal. Caudal truncated. The pectoral fin is extremely broad, the five or six lower rays being elongated beyond the extremity of those next above them. Their extremities are somewhat thickened; and they, like the similar outer ventral rays, serve

as an organ of locomotion. The pectoral rays extend to the ventral rays beyond the vent. The latter are as long as the head without snout.

Red, with a large black spot on the posterior half of the spinous dorsal, and with another between the anal spines.

Inland Sea.

Sebastes oblongus.

Allied to *S. inermis* and *pachycephalus.*

D. 12 | $\frac{1}{12}$. A. $\frac{3}{6}$. L. lat. ca. 65.

The height of the body is contained thrice and a half in the total length without caudal; the length of the head twice and three fifths. The scales are rather irregularly arranged, and much smaller above than below the lateral line; on the upperside of the head they advance to the nostrils, very minute ones covering even the præorbital. The snout is pointed and much longer than the eye, the diameter of which is one sixth of the length of the head, and equal to the width of the flat interorbital space. None of the spines on the upperside of the head project; and those of the præoperculum are obtuse and denticulated. The teeth form broad villiform bands in the jaws as well as on the vomer and palatine bones. The maxillary reaches to the vertical from the hind margin of the eye. Dorsal spines strong; the fourth to the seventh are the longest, two fifths of the length of the head. Anal spines stronger, but much shorter than the longest of the dorsal. Brownish marbled with darker; lower parts and all the fins with brown spots; an oblique brown streak from the præorbital towards the angle of the præoperculum.

Inland Sea.

Scorpæna miostoma.

Allied to *Sc. zanzibarensis* and *Sc. longicornis,* but with a considerably narrower mouth.

D. 11 | $\frac{1}{10}$. A. $\frac{3}{5}$. L. lat. 45.

Palatine teeth; the vomerine teeth form a simple open V-shaped band. The height of the body is less than the length of the head, which is contained twice and one third in the total length without caudal. Head nearly entirely scaleless. Upper jaw slightly overlapping the lower. Orbital tentacles broad, fringed, shorter than the eye, which equals the length of the snout. Interorbital space deeply concave, with a pair of slight ridges within its concavity. Vertex with

a quadrate depression, which is rather broader than long and surrounded by spines. *The maxillary does not extend backwards to below the middle of the eye.* All the cutaneous appendages on the head, body, and fins are well developed. The fourth and fifth dorsal spines are the longest, two fifths of the length of the head, and equal to the second of the anal fin, which, however, is stronger. Eight of the pectoral rays are branched. Body and fins marbled with the usual colours of this genus, but without any peculiar markings. The axil of the pectoral is scarcely spotted; and the lower part of the head is white.

Market of Yokohama.

Polymixia japonica.

D. $\frac{5}{34}$. A. $\frac{4}{16}$. V. 1/6. L. lat. ca. 60. L. transv. 8/17.

The upper jaw projects more beyond the lower than in either of the two other species. The maxillary extends to below the hind margin of the eye, which is one third of the length of the head. Six vertical series of scales on the cheek. Ventral fins short, rather more than one third of the length of the head. Top of the dorsal and extremities of the caudal lobes black.

Off Inosima.

Platycephalus rudis.

D. 1 | 8 | 11. A. 11. L. lat. ca. 70.

The length of the head is one third of the total without caudal; and its width between the præopercular spines is more than one half of its length. All the bones on the upper surface and the scales covering its sides are rough. The space between the eyes is concave, its width being one half of the vertical diameter of the eye. Superciliary edge serrated; ridges with distant spines along the infraorbital and above the operculum, the central ridges of the crown of the head being rather obscure. Opercular ridge not serrated. Three spines at the angle of the præoperculum, the lower of which is the smallest, the upper the longest, but only half the length of the eye. Only the foremost part of the lateral line is spiny. Ventral fins reaching to the anal. Greyish, with black dots on the trunk and operculum. The spinous dorsal and ventral black, the second dorsal and pectoral with blackish dots. Caudal irregularly marbled with blackish.

Market of Yokohama.

Gobius yokohamæ.

D. 6 | 11. A. 11. L. lat. 26.

The height of the body is contained four times and a half in the total length (without caudal); the length of the head thrice and three fourths. Snout obtuse, as long as the eye, the diameter of which is more than one fourth of the length of the head. Eyes very close together; mouth oblique, with the jaws subequal in front, reaching to below the front margin of the eye; a very small canine tooth on each side of the lower jaw; head and occiput naked, but nape covered with small scales. A wide pore in front and behind the interorbital space, and two others behind the eye; they are the openings of the muciferous channels. Seven longitudinal series of scales between the second dorsal and the anal; the ventral fin terminates at some distance from the vent, which is midway between the root of the caudal and the præoperculum. Dorsal fins rather lower than the body; caudal slightly pointed, as long as the head. Light brownish olive, with a series of five brown spots along the lower half of the body, the last being on the root of the caudal and the most distinct; a triangular black spot occupies the lower angle of the operculum; gill-membrane on the throat blackish.

Small as this species is ($2\frac{1}{2}$ inches) it is adult, a female, having the ovaries fully developed.

Yokohama Bay.

Lepidopus tenuis.

D. 126. A. 71.

This species is distinguished at the first glance by the extraordinary slenderness of the body, the depth of which is not much more than one fourth of the length of the head; the latter is two fifths of the length of the trunk, and one seventh of the total. The lateral teeth are comparatively stronger and fewer in number than in *L. caudatus*. The terminal portion of the tail becomes so slender that its entire depth is occupied by the mucous canal of the lateral line, which is very wide. Caudal fin very small. The anterior anal rays are not free, but hidden below the skin. Uniform silvery.

Off Inosima.

Sirembo grandis.

Head rather short and broad, with obtuse snout overlapping the lower jaw. Eye small, about one third the length of the snout, and one eleventh of that of the head. Mouth rather

wide, the maxillary extending to behind the eye, barbels none. Teeth of the jaws, vomer, and palatine bones in villiform bands. Nostrils gaping, oval openings, of which the anterior is surrounded by a membranous wall. Præoperculum crescent-shaped, without any armature; operculum with a strong spine above.

Scales minute; also the entire head, even the space between the nostrils, covered with minute scales. Lateral line indistinct for the greater part of its course.

The dorsal fin is, like the anal, enveloped in a thick, scaly skin. It commences with short rays above the middle of the pectoral fin. The pectoral is rounded, broad, and remarkably short, about half as long as the head. Ventrals inserted below the angle of the præoperculum, at some distance behind the symphysis of the humerus. Each ventral filament is bifid, the inner part being the longest. Distance of the vent from the root of the pectoral more than the length of the head.

Brown; darker behind, lighter in front. Fins blackish. Cavity of the mouth grey, peritoneum black.

Total length 29½ inches, length of the head 5¾ inches, length of ventral filament 3 inches. Distance of the vent from the snout 12½ inches.

South of Yeddo.

Macrurus macrochir.

1 D. 11. V. 7.

Snout produced, tetrahedral, rather longer than the large eye; a bony ridge runs along the median line of the upper side of the snout, and a fold of the skin along that of the anterior side. Interorbital space slightly convex, its width being somewhat more than the diameter of the eye. Infraorbital ridge low. Mouth rather wide, more lateral than in the other species of this genus. Barbel very small. Teeth "*en carde*," in a narrow band in the upper jaw, and in a single series in the lower. No scaleless fossa on the side of the temple. The two limbs of the præoperculum meet at a somewhat acute angle, which is produced backwards.

The second dorsal spine is smooth and slender; and the second dorsal fin commences at a distance behind the first which is about one half of the length of the head. Pectoral fin remarkably long, extending to the origin of the second dorsal, and equal in length to the head the snout not included. The outer ventral ray not produced.

Scales rather thin, with from eight to ten finely crenulated radiating ridges, which do not project beyond the margin of the scale. There are five scales in a transverse series between

the first dorsal and the lateral line. The head is covered with similar radiated scales, but irregular as regards size and arrangement; lower limb of the præoperculum scaly.

Brownish black.

Off Inosima.

Macrurus parallelus.

1 D. 10. V. 7.

Snout much produced, subtrihedral, pointed, nearly twice as long as the large eye. Scales with five or even seven spiny ridges, which are nearly parallel to one another, and of which the middle one is the strongest, terminating in a more or less strongly projecting spine. Head covered all over with irregular, spiny, tubercle-like scales, of which those along the infraorbital crest and along two lines on each side of the crown of the head are the strongest. There are five scales in a transverse series between the first dorsal and the lateral line. No scaleless fossa on the temple. Outer ventral ray produced into a short filament.

Off Inosima.

Coryphænoides longifilis.

1 D. 13. A. 9.

Snout as in a *Gadus*, swollen, obtuse, not projecting beyond the mouth, the jaws being equal. Eye rather large, but shorter than the snout, the length of which equals the width of the interorbital space. Mouth very wide, extending nearly to below the hind margin of the eye. Teeth of the outer series in the upper jaw much stronger than the others; those of the lower strong, in a single series. Barbel minute. Præoperculum with the hind margin not excised, with the angle rounded, and both limbs scaly.

Scales rather thin and small, with about five feeble radiating keels: There are thirteen or fourteen scales in a transverse series between the first dorsal and the lateral line. The second dorsal spine is feeble, somewhat produced, obscurely denticulated in front. The second dorsal fin commences immediately behind the first. Pectoral much prolonged, as long as the head. The outer ventral ray produced into an exceedingly long stiff filament. Brownish black.

South of Yeddo.

Coryphænoides altipinnis.

1 D. 12. V. 9.

The snout is rather short, slightly projecting beyond the mouth, with a prominent tubercle in the middle. Eye large,

not much shorter than the snout, or than the width of the interorbital space. Mouth extending beyond the middle of the eye. Teeth of the outer series visibly stronger than the remainder. Barbel shorter than the eye. Præoperculum with the hind margin not excised, and with both limbs densely scaly.

Scales with five radiating spiny ridges, the spines being very small. There are eleven or twelve scales in a transverse series between the first dorsal and the lateral line. Second dorsal spine considerably produced, armed in front with rather distant barbs. The second dorsal fin commences at a short distance behind the first. The outer ventral ray produced into a filament.

South of Yeddo.

Coryphænoides nasutus.

D. 11 | 95. A. 110. V. 10.

Snout obtusely conical, with a rather sharp upper edge, and with a projecting barb in the middle. The snout projects beyond the mouth, the cleft of which does not quite reach to below the middle of the eye. The teeth of the outer series are scarcely stronger than the remainder. Barbel very small. The width of the interorbital space is not quite equal to the vertical diameter of the eye.

The scales are equally rough over the whole of their surface, the spinelets being subequal in size, densely packed, and not arranged in series. There are seven or eight scales in a transverse series between the first dorsal and the lateral line. Second dorsal spine somewhat produced, armed along its anterior edge with barbs pointing upwards and rather closely set. The second dorsal fin commences at a considerable distance behind the first, the distance being equal to the length of the head. The outer ventral ray produced into a long filament.

South of Yeddo.

Coryphænoides asper.

1 D. 11. V. 10–11.

Snout short, slightly projecting beyond the mouth. Eye of moderate size, not much shorter than the snout. Interorbital space flat, wider than the eye. Mouth extending to below the middle of the eye. Teeth of the outer series stronger than the remainder. Barbel rather shorter than the eye. Præoperculum with the hind margin not excised, and with both limbs densely scaly.

Scales with five radiating series of strong and low spines.

There are six scales in a transverse series between the first dorsal and the lateral line. Second dorsal spine considerably produced, armed in front with rather distant barbs. The second dorsal fin commences at a short distance behind the first. The outer ventral ray produced into a filament. Black.

South of the Philippines and Japan.

Coryphænoides leptolepis.

1 D. 10. V. 9.

The snout is rather long; but its front portion projects but slightly beyond the mouth. The eye is comparatively small, about half the length of the snout, and much less than the width of the interorbital space. Mouth wide, extending to below the hind margin of the eye. The teeth of the outer series are much stronger than those of the villiform band. Barbels as long as the eye. The præoperculum with the hind margin excised, and with the angle rounded and produced backwards; in young examples the lower margin is toothed. Lower limb of the præoperculum scaleless.

Scales thin and deciduous; most with five or seven radiating keels, some, especially on the back, nearly or quite smooth. There are seven or eight scales in a transverse series between the first dorsal and the lateral line. Second dorsal spine slightly produced, with barbs in front, which are rather distantly arranged. The second dorsal fin commences at a short distance behind the first. The outer ventral ray produced into a long filament.

Off the coasts of Brazil and Japan, Mid-Pacific.

Coryphænoides villosus.

1 D. 10. V. 7.

Snout compressed, very slightly projecting beyond the mouth, short, not longer than the eye, which is of moderate size. Interorbital space broader than the eye. Mouth rather small, not extending to below the centre of the eye. Infraorbital ridge very obsolete. Teeth in villiform bands in both jaws. Barbel very small and slender.

The scales are armed with erect spines, which give to the body the appearance of being covered with short villosities. A series of stronger spines runs along each side of the base of the second dorsal and anal fins. The second dorsal spine is very slender, smooth; the second dorsal fin commences immediately behind the first. The outer ventral ray produced into a very short filament. Blackish.

South of Yeddo.

Pleuronectes yokohamæ.

D. 68–72. A. 52.

The height of the body is contained twice and one sixth in the total length (without caudal); the length of the head four times. Snout shorter than the eye, the diameter of which is one fifth of the length of the head; lower jaw prominent; maxillary as long as the eye; the upper jaw with a series of fifteen truncated teeth on the blind side, none on the other; eyes separated by a very narrow space covered with rudimentary scales. Scales small, cycloid, imbricate, larger about the lateral line than elsewhere; the anterior curve of the lateral line is strong in an adult specimen, but much more open in a young one; its width equals the length of the pectoral; pectoral more than half as long as the head; ventrals entirely separate; fin-rays smooth; the dorsal commences immediately behind the front margin of the orbit. The free portion of the tail much higher than long. Gill-rakers very short, abouttten on the first branchial arch. Blackish brown, uniform or indistinctly mottled with darker. In the young specimen the rays of the vertical fins are dotted with brown, five or six of them (of the dorsal as well as of the anal) having a broad black ring. In the adult example those fin-rays are uniformly coloured, only traces of the dark rings being still visible.

Yokohama Bay.

Leuciscus hakuensis.

D. 10. A. 10. L. lat. 73. L. transv. 15/14.

The height of the body is one fourth of the total length (without caudal); the length of the head two ninths. The diameter of the eye is one fifth of the length of the head, and two thirds of the length of the snout, or of the width of the interorbital space. The head is remarkably small, with narrow, pointed snout, the cleft of the mouth being oblique and not reaching to the front margin of the eye. Upper jaw overlapping the lower. Origin of the dorsal fin above the root of the ventrals, midway between the snout and the root of the caudal fin; fins generally small and short, the pectoral being not more than one half of its distance from the ventral. Scales very indistinctly striated; there are eight longitudinal series between the lateral line and ventral fin. Pharyngeal teeth 5 | 2, pointed. Coloration uniform.

Lake Hakou.

Family **Bathythrissidæ.**

Body oblong, with rounded abdomen, covered with cycloid scales; head naked; barbels none. Margin of the upper jaw formed by the intermaxillaries mesially, and by the maxillaries laterally. Opercular apparatus complete. Adipose fin none; dorsal fin much elongate, many-rayed; anal fin short. Stomach with a blind sac; pyloric appendages numerous. Gill-apparatus well developed; pseudobranchiæ; gill-openings wide; an air-bladder. Ova very small; ovaries without duct.

BATHYTHRISSA.

Body covered with scales of moderate size. Head narrow, oblong, with the muciferous channels much developed. Eye large. Mouth narrow, coregonoid, with bands of minute teeth imbedded in the thick lips; maxillary with a marginal row of very small teeth. Caudal fin forked, with a dense layer of small scales. Air-bladder with very thick walls, terminating in two short horns in front, pointed behind.

Bathythrissa dorsalis.

B. 6. D. 56. A. 12. V. 9. L. lat. 112. L. transv. 8/13. Cæc. pylor. 14.

The general aspect of this remarkable fish is that of a much elongate *Coregonus*, its greatest depth being one fifth of the length of the body (without caudal). The head is low, elongate, one fourth of that length; the large eye, the diameter of which is rather more than one fourth of the length of the head, occupies nearly the middle of its length, slightly encroaching upon the upper profile. The width of the interorbital space is much less than the diameter of the eye. Snout projecting beyond the mouth as in a *Coregonus*; mouth laterally extending to below the anterior nostril; the labial fold of the mandible does not extend across the symphysis. Nostrils close together, separated by a membrane only. The muciferous channel of the infraorbital is longitudinally divided by a straight ridge; angle of the præoperculum somewhat produced backwards; operculum small; sub- and interoperculum narrow.

Scales very regularly arranged; lateral line straight, running along the middle of the tail.

The vent is situated far backwards, its distance from the caudal being less than the length of the head.

The dorsal fin is low, but the anterior rays are somewhat

the longest; it commences above the middle of the pectoral, and terminates above the middle of the anal. Also the anal rays are short, the anterior being the longest. The caudal fin is deeply forked, densely covered with scales. The pectorals are more, the ventrals less than half as long as the head. Ventrals inserted midway between the anal and the head.

Upper parts brownish, shining silvery; lower parts silvery, minutely dotted with brown.

Off Inosima.

Salmo macrostoma.

B. 12. D. 13. A. 14. L. lat. ca. 130.

This fish is distinguished by its remarkably pointed snout, the upper jaw being rather the longer, and by its wide oblique mouth. The narrow and slightly curved maxillary extending considerably behind the hind margin of the orbit. The head is small, only one fourth of the total length without caudal. Eye small, nearly one seventh of the length of the head. Teeth rather small; one pair on the head of the vomer is followed by three or four other small teeth, arranged in a series. Præoperculum crescent-shaped, without lower limb. Body rather deep; its depth being equal to the length of the head. There are sixteen or seventeen scales in a series obliquely descending from behind the adipose fin to the lateral line. Dorsal fin but little higher than long. Caudal fin deeply emarginate. Silvery; with nine parr-marks along the lateral line, and with several round spots above and below them on the sides.

Yokohama market.

Aulopus japonicus.

D. 15. A. 9. L. lat. 43. L. transv. $4\frac{1}{2}/6$.

The length of the head is contained thrice and one fourth in the total without caudal. The diameter of the eye equals the length of the snout, and is contained thrice and two thirds in the length of the head. Interorbital space concave, one half of the width of the eye. Maxillary extending to behind the middle of the eye. Body irregularly marbled with blackish.

Market of Yokohama.

Halosaurus affinis.

Snout much produced, but less so than in *Halosaurus rostratus*, its præoral portion being scarcely one half of its length. Eye of moderate size, one third of the postocular portion of

the head, and equal to the width of the interorbital space. Maxillary not reaching to the front margin of the eye. The length of the head equals its distance from the root of the ventral, the origin of which is but slightly in advance of that of the dorsal. Nearly all the scales are lost: only some of the lateral line remain; they are much larger than the other scales; and on the tail, where the lateral line approaches the lower profile, these larger scales are separated from the anal fin by one series of small scales only. Otherwise there is the greatest similarity between this species, *Halosaurus rostratus*, and *H. Owenii*.

South of Japan.

Congromuræna megastoma.

The length of the head is two thirds of that of the trunk, the tail being longer than the body; upper jaw much projecting beyond the lower, rather pointed; mouth extending far behind the middle of the eye, which is large, two ninths or one fifth of the length of the head, and nearly two thirds of that of the snout; posterior nostril a wide, round, open aperture; length of the pectoral fin one third of that of the head; the dorsal commences above the root of the pectoral; vertical fins with a light margin; terminal portion of the tail black, extremity of the fin white.

Off Inosima.

Synaphobranchus bathybius.

Mouth and dentition as in *S. pinnatus*. Eye one half or two thirds of the length of the snout. The length of the body is contained only once and a fourth in that of the tail. The dorsal fin commences above or immediately behind the pectoral, which is only one third the length of the head. Epidermoid productions quite rudimentary, lanceolate, imbedded in the skin; cheeks naked. Dorsal and anal fins low, especially the former.

Uniform black.

Middle of North Pacific; south of Yeddo. Midway between Cape of Good Hope and Kerguelen's Land.

Synaphobranchus affinis.

Allied to *S. brevidorsalis*, from which it differs in the following points:—The length of the body is two fifths of that of the tail; root of the pectoral fin midway between the end of the snout and the vent. Dorsal fin commencing at some distance behind the vent. Pectoral of moderate length, rather

less than one half of the length of the head. Epidermoid productions rudimentary, lanceolate, obliquely arranged, imbedded in the skin. Anal higher than dorsal.

Blackish brown.

Off Inosima.

Nettastoma parviceps.

Head small, its length being two fifths of the distance between the gill-opening and vent (more than one half in *N. melanurum*). Dorsal fin commencing in advance of the gill-opening. In other respects similar to the Mediterranean species.

South of Yeddo.

Monacanthus modestus.

D. 36. A. 34.

Skin velvety, without spines or bristles on the tail; the height of the body is contained twice and three fourths in the total length (without caudal); upper profile of the head convex, the gill-opening extends downwards to the level of the middle of the root of the pectoral; the dorsal spine is inserted above the posterior third of the eye; it is scarcely half as long as the head, or as its distance from the second dorsal fin; it is armed with four series of very small barbs, the two front series being very close together; the anterior half of the dorsal and anal fins elevated, somewhat higher than the dorsal spine; ventral spine fixed.

Uniform brownish grey; caudal blackish, with the interradial membrane whitish and without any cross bands.

Inland Sea.

MISCELLANEOUS.

M. K. A. Zittel on Fossil Hexactinellida.

To the Editors of the Annals and Magazine of Natural History.

Gentlemen,—Permit me to correct a slight mistake that has crept into Prof. Zittel's diagnosis of the scheme I adopted in the year 1870 * for the natural subdivision of the then known Hexactinellid sponge-forms, and which error is reproduced in Mr. Dallas's translation in the last number of the 'Annals.' Of the two groups of the "*Coralliospongia*" and "*Calicispongia*" then instituted by me, it was the former of the two that was made to embrace all those species distinguished by the possession of an "anastomosing

* 'Monthly Microscopical Journal,' vol. iv. p. 252, 1870.

or coherent reticulate skeleton," while with the latter were associated types in which the skeleton consisted of "isolated or loosely interwoven spicules" only. Zittel, as I find by reference to a copy of his original essay, with which he has kindly furnished me, makes it accidentally read exactly the reverse. In my original diagnosis (*l. c.* p. 252) I further proposed to characterize the group of the "*Calicispongiæ*" as possessing spicule-protected gemmules instead of both having "naked membranous gemmules" as rendered by Prof. Zittel.

W. Saville Kent.

4 Marine Terrace, St. Heliers, Jersey,
Oct. 17, 1877.

Phenomena accompanying the Metamorphosis of Libellula depressa.
By M. Jousset de Bellesme.

The author gives an extraordinary account of the mode in which *Libellula depressa* expands to its full size and extends its wings after quitting the pupa-skin. After describing the well-known process of the emergence of the insect, he inquires by what mechanism does the insect inflate itself and increase its volume to such an extent that after issuing from its little envelope it suddenly becomes double its former size.

He states that at this time the function of respiration, which is very active in the adult dragonfly, is not yet set up. There are no movements of inspiration and expiration; the abdomen is cylindrical; and the deep fold in the ventral surface of the abdomen, which he regards as essential to respiration, is not yet in existence. On dissection the air-sacs of the body are found to be empty and flaccid.

Nevertheless the inflation of the dragonfly is effected by air; and if the body is cut through with a pair of scissors it collapses in a moment like a balloon. By taking suitable precautions and dissecting the animal under water, it is found, he says, that the digestive tube here performs a most unusual physiological part. It is so much distended that it absolutely fills the whole interior of the body, pushing the other organs against the integuments. Under the influence of this energetic pressure the blood is pressed forcibly towards the periphery, distends the eyes, and gives the head its definitive form; then passing into the wing, between the two membranes, which up to this time are separate, as M. Blanchard has described them, it accumulates in the wing, unfolds it, and circulates in it, depositing the pigment which is destined to colour it. During this time the integuments, which are distended and bathed by the nutritive fluid, acquire their proper colour and solidity. It is by swallowing the air and storing it in its digestive tube, says the author, that the *Libellula* obtains the force necessary for the accomplishment of most of its transformations; and he thinks there is every reason to believe that the same thing occurs in many other insects.—*Comptes Rendus,* August 20, 1877, p. 448.